GAS JOURNAL

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A BOLD, LONG-TERM FUEL PLAN

"WE have come to the conclusion that a reasonable forecast of the development of the Gas Industry is that it will in 10 years' time have increased its sales by 20% above the level of to-day." This is from the Report of the Committee of Enquiry into the Gas Industry (the Heyworth Committee) set up by the Minister of Fuel and Power in 1944. The Report was published at the end of 1945. "It should be the target of a national domestic fuel policy to secure that the 50 million tons of bituminous coal now burnt with a working efficiency of 20% should be replaced in 20 years by smokeless solid fuel, or by bituminous coal burnt smokelessly, or by gas, or by electricity, with an average coal economy efficiency of not less than 40%. This would render possible the virtual abolition of domestic smoke, less labour and dirt in the house, and either doubling the useful heat in the smaller houses at little or no greater cost to the householder and no increase in the consumption of coal, or an increase of 50% in the useful heat in the smaller houses with a substantial reduction in cost to the householder and a saving to the nation of perhaps 10 million tons of coal per annum." This is from the Report by the Fuel and Power Advisory Council on Domestic Fuel Policy (the Simon Report) published in the spring of 1946. Those suggestions point in the same direction—that we must use our coal to far better advantage—and they indicate clearly enough that the present capacity of the carbonizing industries is wholly inadequate.

Since the issue of the foregoing reports the gravity of the entire national economy has become greater and has been made more apparent, and it has become a matter of the utmost urgency that we must use our coal more efficiently and that we should re-establish our export market. In general the path is clear, but we are making next to no headway. Hence the importance of the "National Fuel Plan" which, released for publication last week, we published in full in the "JOURNAL" of November 19. The plan is by Colonel W. Moncrieff Carr, Managing Director and Acting Chairman of the United Kingdom Gas Corporation, than whom the carbonizing industries know no stauncher advocate. The plan, admirably advanced in simple terms, is essentially an individual approach to the problem by one of vast technical and administrative experience in the Gas Industry. It has been submitted to the Prime Minister and we are assured that it is being studied by the Ministry of Fuel and Power. It is a bold plan and it is put forward at a time of national difficulty. It envisages a development to take place in 10 years to make 200 million tons of coal do the work of 250 million tons. It calls for an expansion of the coal carbonizing industry to four times its present capacity within that period and it involves capital outlay in the region of £400 million to £450 million over the 10 years. Colonel Carr is firmly convinced that a long-term policy of the kind would be thoroughly justified, that in the event the whole programme would be self-financing, would lower industrial costs, and would immensely strengthen the whole fuel economy of the nation. His contention is that by substituting carbonization fuels for raw coal the country would save enough coal for all home needs and leave abundant supplies for export also. To become feasible the plan must rely on first priority of access to raw materials, but Colonel Carr contends most vigorously that availability of fuel is the key to recovery and that the Gas Industry should be accorded this first priority before any other form of national activity except coal mining itself—that the steps being taken towards recovery by the Government can at best provide but momentary relief; that the problem should be tackled fundamentally and courageously. Certain it is that industry in general, to cope with export drives and home consumption, is crying out for fuel which can be utilized for heat purposes at a high efficiency and which is available on tap. It is certain, too, that it lies within the power of the carbonizing industries, the Gas Industry and the coke ovens, to cope with this demand in the national interest—provided that ideas of petty yearly increases in gas and coke output are replaced by a powerful drive, appropriately supported financially, to effect expansion on the large scale, and this without delay. Of course there are conflicting interests, but the carbonizing industries—irrespective of type of ownership—have a compelling claim for priority treatment.

COMPENSATION UNDER NATIONALIZATION

IN the taking-over of an industry by the State there can be no hard-and-fast basis of compensation. Terms equitable to one particular industry might well prove inequitable to another. Terms of compensation must be suited to the particular industry to be taken over; and it is essential—this was, in fact, emphasized by the Financial Secretary to the Treasury during the Committee Stage of the Electricity Bill—that the terms arrived at should do justice to the people dispossessed. This question of compensation is uppermost in the minds of the Gas Industry to-day—owners (company and municipal alike), directors, and employees. As a background it should be remembered that during its long history Gas Acts and Orders have interlinked the interests of consumers, shareholders, and employees, and that, broadly speaking, investments in the Industry have been made on the basis of their being permanent and affording security in respect of dividends; statutory restrictions have been in force throughout, and holdings of the public represent for the most part investments of small dimensions by those who have to rely largely on the income derived from these investments. It would seem only right that compensation to gas shareholders should be based on main-

tenance of income. It is known that difference of opinion exists among local authorities as to the basis of compensation, whether or not on the "real value"; no doubt further discussion will clarify this. Then, with non-statutory companies, should compensation be on the basis of their value as going concerns? These are among the matters to be ironed out. There are other aspects. It would seem only just that directors who lose office as a result of nationalization should be compensated on lines hitherto approved by Parliament, and surely contracts of service with the officers and staff of undertakings should be honoured; and in the interests of the efficient running of the Industry they should be offered comparable service with a Gas Board. Should the services be worsened, there ought to be compensation not inferior to that applicable under existing legislation, and this should apply also to manual workers. Again, the pension rights and expectations and co-partnership rights of employees should be honoured. On the whole question of compensation in its many phases—and none will disagree that the question is all-important—it is a feature of lively satisfaction that there exist recognized channels of discussion, and, in the British Gas Council, a central channel of contact with the Government departments concerned—a knowledgeable channel whereby the considered views of the various sections of the composite Gas Industry can be properly put forward.

THE THAMES GRID (NORTH BANK)

THE Presidential Address of Mr. H. J. Escreet to the Southern Association of Gas Engineers and Managers—published in the "JOURNAL" last week—dealt with two, or, perhaps one might say, three subjects. As became an engineer of long standing in the Industry he spoke of the position of the District Associations in relation to the parent Institution in a nationalized industry. As Distribution Engineer to the most heavily loaded system in the country he dealt with the Gas Light and Coke Company's Grid; and, as a branch of that subject, on the allocation of distribution costs between the different types of load according to load factor.

The proposal that District Associations should become District Sections of the Institution presents difficulties as well as advantages. Some of the difficulties may disappear when the Industry is nationalized, but not all. The rejection of the proposal on the ground that the Associations afford opportunity for the discussion of commercial and sales matters not suitable for the agenda of the Institution will cease to have validity if such subjects are removed to regional headquarters. But the advantage that many more technical and scientific subjects can be discussed in the districts than can possibly be adequately dealt with at the two annual meetings of the Institution remains. The more important papers could be discussed at the meetings of as many District Associations as were particularly interested in them. After all, the system works well with most other engineering institutions. There is the difficulty that the qualifications for membership of the several District Associations are not the same, and generally not so highly graded, as those for membership of the Institution; but this is an anomaly which tends to disappear. It would certainly be an advantage if the agenda of the Institution meetings could be reserved for papers of wide general interest and if discussions there were to assume a broader, more statesmanlike basis than to be concernel with relatively small matters of detail, as they too often have been hitherto. The Districts could thrash out the details. The Institution could draw all together in broad outlines of policy.

Mr. Escreet's description of the grid system through which gas is distributed over his Company's immense district, covering practically the entire urban region on the north bank of the Thames, handling 30,000 million cu. ft. of gas per annum, was most able. The system has stood up to several terrific shocks in the last few years. Its war service is a story of personal heroism as well as of technical competence. The recent labour troubles have tested it perhaps even more severely. At no time has it failed. It will indeed be a crime if, in the structure of nationalization, this very fine system is disturbed.

The direction of the grid from the central room at Westminster appeals to the imagination. One wonders, to mention a very small point, to what extent the charting of anticipated demand is being assisted by the forecast of noon temperatures 24 hours ahead, which is now a feature of the Meteorological Office daily report. There is in this portion of the Address a great deal which will be of interest and service to distribution engineers. The rule that gas supplied "varies fairly closely with the square root of the initial pressure" is an interesting point.

The somewhat startling results of an investigation of the allocation of distribution costs to base load (cooking and water-heating), seasonal, and peak load due mainly to space heating—even if, as Mr. Escreet said, the final conclusions have only an academic value—may well cause some revision of thought on the subject of load-building. The data and their discussion were concisely presented in the Address. The result indicates that the distribution cost of seasonal space heating is nearly 2½ times that of the base load. For peak loads it is "extremely high."

SPACE HEATING AND GAS PRODUCTION

WE regard the recent address given by Mr. F. M. Birks as President of the Fuel Luncheon Club as of the utmost importance in presenting a proportioned outlook, resulting from much experience and unrivalled facilities, on the relative position of gas and coke in meeting the demands in this country for space heating. We published the address in full in our issue last week. The study of the effect of temperature on gas demand in the vast area of supply of the Gas Light and Coke Company has thus far extended over 12 years, and it is upon the data accumulated and carefully analyzed that Mr. Birks draws his conclusions. From the data it was possible to arrive at a "standard temperature" (for the particular area of supply) for every day of the year and to indicate the average limits of temperature deviation likely to occur for the 24-hour day. The standard temperature for a mid-winter day was found to be 40° F. and at mid-summer 65° F. It is possible for the average temperature on a mid-winter day to deviate 20° above or below the standard; at mid-summer the range is reduced to 15° above or below the standard. A figure of 20° F. is used as the basis for assessing maximum heating requirements. Then there is the duration of the cold weather. In 1947 there were as many as 19 days below 30°, the lowest daily average being 22°. Now a drop in temperature from 65° to 64° results in an increase in gas demand in the area of the Gas Light and Coke Company of 1¼ million cu. ft. a day, whereas a drop from 25° to 24° results in an increase of 5½ million cu. ft. At present the space heating load factor is about 20%; the overall load factor being in the region of 50%. In all the very cold spells the stock of gas has never been more than sufficient to tide the Company over the first day or two; and, as Mr. Birks said, "for storage to be of any real value in meeting winter peaks an uneconomically high stock would be required and, indeed, some of that stock would probably remain idle for half a century or so."

Hence the conclusion that solid fuel should be used for supplementary heating at time of peak load. This is the "most satisfactory and economic method of dealing with the problem." And this brings us to the question of district heating. If district heating systems using solid fuel were designed to carry the load irrespective of the outside temperature, there would be no need to call on gas or electricity to meet these peaks. If, as Mr. Birks said, domestic premises

are equipped with inadequate plant, trusting that its deficiency will be met by other means, the sponsors of this policy are living in a fool's paradise. The country has not the resources to produce elaborate and expensive plant to tide over periods of very low temperatures.

KENT COAL

THE story of the adventurous development of the Kent Coalfield told by Mr. G. le B. Diamond to the Eastern District of the Southern Association of Gas Engineers and Managers (see last week's "JOURNAL" and our issue to-day) is not particularly creditable, so far, to anyone concerned. But the initial fumblings are now well in the past and it is definitely established that coals of considerable technical interest and value are obtainable in Kent. Thirty thousand tons per week is being raised in four collieries, and this quantity is likely to be stepped up sharply in the near future. Some of this coal appears capable of being carbonized with profit, and that fraction should be reserved from the outset to that purpose. As Dr. Lessing put it during the discussion: "Without preparation some of the good gas coal would be sent to power stations and assets of the country would be wasted."

From the gas-maker's point of view the Chislet coal appears to be the most interesting, or in more general terms the coal of the north-western part of the region. It is a pity that no thorough systematic investigation into its properties and capabilities seems to have been carried out. We are left to piece together evidence derived from a variety of sources. The trials and tests at the Stratford Works of the Gas Light and Coke Company revealed that Chislet travelled through the continuous verticals without trouble but that the throughput had to be reduced. Comparison of these trials with others suggests that the small retort was more suitable for its treatment than the larger sizes, though even in the large size the difficulties disappeared when temperatures and other conditions were suitably adjusted. The very high bulk density is noted, but no explanation of this is so far given. Why should this be difficult? The gas-making results, so far as these can be correlated, indicate that Chislet, from the point of view of make per ton at a given calorific value, lies somewhere between coals of the Midland coalfields and those of S.W. Scotland, but the curious feature is that whereas one would expect the permissible throughput —*i.e.*, the speed of carbonization—to lie in the same relation, it is in fact very much less than either of them. This is a peculiarity which is well worth studying with a view to explanation.

Here is a coal which is comparatively new to the Industry. One wants to know, if it is to be treated in continuous verticals, at what calorific value gas should be made to give the best yield per ton and per retort. One would think that it would be worth while to set up, in the first place, a sizeable pilot plant to make those investigations, with regard to this particular coal, which we outlined in these columns on Sept. 11 last year.

It is fortunate that this coalfield lies in a region which has known integration of gas undertakings for some time and that the several interests concerned are accustomed already to taking broad views. Mr. Diamond discussed, as one used to the exercise, whether the gas-making coals should be treated at the coalfield or in one or other of the centres of population. He recognizes the difficulties of the former in present conditions. Not only must the work be brought, in these days, to the workers, but there is the problem of distribution not only of the gas but of the coke. He is inclined to the view that a commencement, at any rate, in the erection of plant to carbonize these coals should be made in works already existing. He sees already that Chislet coals can be carbonized in all the standard types of plant and that there are several areas where development and concentration of gas-making plant is likely to take place in the next few years. There appears no reason at all why this development should not be so designed as to exploit profitably the coals which are lying close at hand.

THE SMALL WORKS MAN

THE President of the Institution of Gas Engineers, Dr. Harold Hartley, as guest of the Eastern Association of Gas Engineers and Managers at the Association's autumn meeting this month, put in a plea for the engineers and managers of the smaller undertakings—"men who, if they had failed in their tasks, would have done a disservice much greater than the mere magnitude of their works might suggest, by bringing gas into disrepute; men who had held tight and done good work with the small means at their disposal." Too often these men, whose duties cover the whole gamut of works management, sales, and distribution, are denied the opportunities open to the more specialized departmental managers of the bigger undertakings. It has been more than once pointed out that the latter would be greatly improved and widened in their outlook by a period of service in the all-round job. Centralization of control would render this at least a possibility. Some of the appointments made to the regional boards of the fuel industries already nationalized have been, to say the least, disquieting. We have the Ministry's promise that these industries shall be run by the technicians and not by the Civil Service. The British Gas Council will no doubt keep this promise before the Minister when the time comes to organize our own Industry under new management.

Especially important is it to see that nothing shall be done to prevent free expression of technical opinion. Broad lines of policy may well be laid down at the higher levels, but, as Dr. Hartley remarked, the great undertakings have never objected to a frank discussion among District Associations, Senior and Junior, of the technical repercussions of such policies. There is every reason why the regional boards and the central boards, whatever may be the set-up of a new organization, should adopt an equally liberal attitude.

It is inevitable that we shall be preoccupied by speculations on the precise form that that organization may take, but particularly on whether it will leave the necessary initiative to the man on the spot to deal with the problems of his own district. Centralization and unity of control over large areas will eliminate the more ridiculous overlappings and sub-divisions of districts that are essentially homogeneous, but need they go so far as to force a uniformity over markets which are fundamentally different in character? Big concentrations of industrial population cannot be properly served by the same methods as those applied to small residential towns or districts which may even be semi-rural in character. Initiative must be left to the executive officer of each separate centre of supply "within the sphere of operation determined by a centrally determined policy." And there will be no harm if such a policy rules out the interference of popularly elected bodies or boards of elderly proprietors with the internal technical affairs of the undertaking which in the past has been a brake on progress, not indeed generally in the bigger undertakings but in too many of the smaller ones. But the success of the Industry so far has been so much a matter of service to the consumer, based on personal contact between the manager and his clients, that it is indeed to be hoped that the Minister will see to it that only the minimum of matters of really general and major import are dealt with at the centre and that authority shall be devolved upon groups, each homogeneous in character, at the periphery.

Dr. Hartley concluded on the note of a National Fuel Policy. Consultations already taking place between the Coal Board, the Transport Commission, and the Central Electricity Authority are to be extended to the Gas Industry when nationalization becomes an accomplished fact. A national fuel policy thus hammered out must have a technical foun-

dation. It is time that our technicians got ready with their suggestions—that they may be able to take part effectively in the discussion "at the highest level" of such problems as that of domestic heating in winter and summer—ready with the answers to such questions as how these loads can be "dealt with by the Gas Industry which to-day supplies some 50% more heat as coke than as gas."

Commentary by "Abaris"

How to Bath

Some members of the great family of Britishers take a cold bath every so often. Now this method of wooing longevity appeals to me in no way and I am baffled by the carcase that can stand very cold water; and this, because I prefer hot water and, secondly, because hot water spells revenues for the Gas Industry.

One great organ of the Press has raised this issue about bathing, so I feel that I ought to rush in and join the battle. The question in dispute is the morning *versus* the bed-time hot bath; note the hot part, for there is no reckoning with cold ablutions. By bathing in the evening it is suggested that there should be no dire effects on the electricity load, which is always a bit wobbly at this time of the year. In other words, those who like to get up with the lark and lave themselves over against a dirty day, are to be discouraged. They must take the plunge o' nights, for electricity's sake.

Time without number have I discussed the night and morning baths, and I have got nowhere; habit is far too strong in some people who refuse to listen to the virtues of going to bed warm, clean, and peaceful. For them the early bath is a stimulus that energizes them for the dash to their train or bus; it is the right beginning to any day; an inviolable right with which none dare interfere. And yet, how it hurts me to say this, going out into our bleak windswept streets, with all one's pores agape, is courting troubles that may lie quiescent for years, only to reveal themselves as the hair turns grey.

The Retort House Mentality

I was discussing this and that with a sapient friend of mine in the Gas Industry the other day. He is forthright, honest, and widely experienced in his profession, and is one who has ideas; I accept his views humbly. During the discussion, he used the expression "retort house mentality," and qualified it with a concise description that was as pertinent as anything I have heard.

We were talking round the subject of gas (as do most gas men) and the consciousness of those in whose hands is the future, and fate, of our Industry. Some, it seems to me, are activated by the retort house mentality. This type visualizes everything in terms of his plant, his coal, his efficiencies, and his figures; to him the overall administration of his works, or undertaking, is an incidental.

District Heating

I dislike the words district heating. There are many reasons, but to me the words are an exaggeration, a misleading exaggeration. Community heating sounds more like a service to my ear, whereas district heating smacks of warming an area, a physical or geographical area, rather than an aggregation of houses. We in the Gas Industry know a good deal about this district heating business, and we say that it is uneconomic in this country.

Let us shelve for a moment what we have heard about district heating, its virtues, its costs, and look at the subject sideways. Obviously lighting and cooking facilities are necessary in any abode that has to be inhabited. Lighting is essential, and is done by electricity; without a means of cooking life would be burdensome, and that implies a fuel. Cooking introduces gas, electricity, oil, or coal as the medium—a generous choice for any customer—all over and above the steam or hot water that will heat the house.

Topping-up heat will be necessary during the coldest spells when the thermometer falls to 20° F. and here again the call is for another fuel to render comfortable the home in question. A precis of the situation is that while the district heat can do so much of warming, it cannot light, cook, refrigerate, or supply that necessary extra topping-up warmth which will be demanded during severe weather. Indeed, it is only a fractional service.

Food

The small quantity of meat and bacon doled out to each of us weekly would have made us smile incredulously a few years back. We still force a smile when we see the ration, but pity is conspicuous in the grimace, for we know that there is nothing we can do about it. Those of us who are rotund will lose weight, and those who are thin will become more cadaverous as the months flow along.

Consider the money spent in the old days on slimming! The desirable figure may now be obtained merely with the honest use of a ration book issued gratis to all *bona fide* nationals, and I often wonder how many people exist solely on their rations.

This leads logically to a consideration of the gas cooking load, the domestic load, first. If we accept the fact that there is less food for most families then we may assume, I think, that less cooking is done. This leads to a major assumption, to wit, that the domestic cooking load is smaller than it would be if we were not rationed. In my household we use far less gas, though it costs more, than before the war; and we have exactly the same gas appliances.

To counterbalance this shrinkage, we have an increased industrial load and, I should imagine, an increased bulk cooking load carried by the many restaurants and cafes opened in recent months. The vast majority have gas cookers. Restaurants defeat rationing but they do at least help to take some of the lost domestic gas cooking load. It's a bad meter that does not register!

Letter to the Editor

Domestic Pressure Cookers

DEAR SIR,—Comment having been made by "Abaris" in the "JOURNAL," the opportunity for exchanging experiences should be grasped. The *sine-qua-non* of pressure cooking is to reduce gas consumption. Apparently, "Abaris" fears that their large-scale adoption would adversely affect the Gas Industry's revenue. The long history of the Industry rejects this, because the introduction of every improved device for the more efficient use of gas has, by increasing its popularity, also increased the total gas sold. Were it otherwise, how could the Industry have grown to such an astronomical size?

At the outbreak of war, I purchased two pressure cookers, one large and one small, and used pressure cooking throughout. Finding that I rarely used the large pressure cooker, and there being no new cooker then available, I parted with it to an officer of a minesweeper, as the cook's galley, with solid fuel as the normal means of cooking, and blackout conditions, was ill-ventilated and unbearably hot. His problem was solved, and additionally the pressure cooker retained the men's food hot, for whenever their spasmodic duties enabled them to snatch their meals, which proved a very welcome surprise.

Pressure cooking originated some 200 years ago, but the device was then termed a "pre-digester," and was used only in hospitals for rare cases, to prepare the food in acute cases of indigestion. Commercialism has found that the use of pressure cooking to cook a meal, in a matter of minutes, is a great feature for salesmanship, but this speediness, though oft-times useful, is not the greatest of its merits.

I found advantage in putting the pressure cooker on a low gas, leaving it for long and indefinite periods, and when it suited my purpose I had my meal, and was thus relieved of becoming a slave to a time-table. As to the actual cooking, the colour of vegetables is not as good, but small bones are cooked to a soft condition, and served well, during wartime, for the cat or the hens.

Right down the ages, the domestic saucepan has ruled the roost, and the gas cooker, the result of much research and experiment, is still subservient to the saucepan. Once we can get away from the domestic saucepan, we at once open the door for further beneficial advances. As example, the pressure cooker is sealed, it cannot boil over, it cannot boil dry, no steam, no smell of cooking escapes; only sufficient water is used to generate the steam, this small supply of water becomes very much enriched, with the soluble salts from the food, but none is wasted by pouring away, hence food values remain at the highest.

Yet the present pressure cooker is but a glorified saucepan, for the heat is applied to its base in the same way, and the contained food, or particles of food, rest on its heated bottom, whence there is a tendency to burn and thereby set up a need for unnecessary cleaning. If this could be obviated (and this may be a gas man's opportunity) by a different method of steam generation then great advantage would quickly follow. As a partial remedy I have thought of trying a false bottom, without perforations, and suitably ribbed on the underside.

Dietitians are not always right, neither are laymen always wrong. If food could be cooked at the same temperature as our internal digestive organs, then humans would be the gainers, as their food would survive the process of cooking, and retain all its food values. Therefore I suggest designers should contemplate as an ideal the most useful combination of long period, low temperature cooking.

Yours faithfully,

H. J. TOOGOOD.

43, Uxbridge Road,
Hampton-on-Thames.
Nov. 15, 1947.

News in Brief

Leicester Gas Committee is to apply for permission to borrow £45,000 to provide additional meters.

Southport Gas Department's coal stocks at Crowlands works are being maintained at 5½ weeks' supply, a considerable improvement on last year.

Whittaker Ellis, Ltd., announce that their Midland Office address is now Belmont Works, Belmont Row, Birmingham, 4. (Telephone: Aston Cross 2241.)

On p. 361 of our issue of Nov. 12 we reproduced a photograph taken when the South Yorkshire Group of Gas Engineers visited Messrs. Parkinson and Cowan's Stretford Works. We regret having wrongly labelled the party—the names should have read *right* to *left*.

Gas-operated Catering Equipment, including cafe sets, water boilers, and other appliances made by well-known British firms are displayed in an exhibition of tea making equipment organized by the South African Tea Bureau which, after a run at Cape Town, will later visit Johannesburg and Durban. Among the exhibitors are James Stott & Co. (Engineers), Ltd., G. F. E. Bartlett & Son, W. J. Hubbard & Sons, Ltd., and Hodgkison & Co.

A Meeting of the London Section of the Institute of Fuel will be held on Dec. 3, at 2.30 p.m., at the Institution of Mechanical Engineers, Storey's Gate, at which a Paper on "Thermal Efficiency of Gas Producers with a Discussion of Relative Merits of Producer Gas and Stoker Firing for Chemical and other Plant," will be presented by Dr. A. C. Dunningham. The Chair will be taken by Dr. C. H Lander. No tickets are required; copies of the Paper can be obtained at the meeting.

Hard Frost in Scotland has caused a rush on gas supplies which has led, in turn, to decreased pressures as the various undertakings decided to conserve supplies. Glasgow Gas Department experienced an increase of 4 million cu.ft. in demand on the first day of the colder weather, as against the previous warmer Monday. Following days, with even more intense cold, continued the drain on supplies. The position is being watched carefully, to ensure that the position is safeguarded. Coal stocks are understood to be generally equal to the situation and unless considerable deterioration develops there is every prospect of successful service through any severe conditions.

Approval of an extension to the Lanarkshire County Council's gas production plant at Uddingston calls for two Holmes Connersville exhausters and one Holmes Connersville station meter. Approval has also been given to the installation of a carburetted water gas plant.

Recommending the Middlesbrough Gas Department to approve the installation of new plant at the gas-works, Mr. J. W. Pallister, Engineer and Manager, said that the cost and inconvenience of pumping syphons was a serious matter. The presence of water in the mains was a constant source of trouble. The installation of the plant at a cost of £14,000 would prevent this trouble.

A British Standard for terms and definitions relating to heat treatment of steel (B.S.1392) has been published by the British Standards Institution. This Standard includes a list of terms in general use throughout the steel industries relating to the heat treatment of steel, and the definitions of these terms are specified. An appendix gives further details of the transformation ranges. Copies can be obtained from the offices of the British Standards Institution, Sales Department, 24, Victoria Street, London, S.W.1, 2s. post free.

The Following Officers and Members of Council were elected at the Annual General Meeting of the Junior Institution of Engineers, on Nov. 14: Chairman, Percy W. Dunn; Vice-Chairman, G. W. Tookey, A.C.G.I.; Vice-Chairman, S. J. Crispin, L.R.I.B.A., M.I.Struct.E. Hon. Treasurer, S. H. Hole, M.I.Mech.E.; Hon. Editor, W. N. S Bevan; Hon. Librarian, J. A. Roberts; Members of Council, A. G. W. Howard, M. R. Morton, A.M.I.H. & V.E., C. Hunnikin and H. A. Turner; Hon. Auditors, J. E. Gray, R. J. Merralls, E. Shires and A. J. Webb.

Councillor G. Comley, a railway signalman, on his re-election as Mayor of Nuneaton, welcomed the prospect of the nationalization of gas undertakings and said the local gas-works had been a black spot in the town for many years. Although the works would have to remain a little longer for storage purposes, it was hoped that soon they would cease to send forth smoke and grit. He was pleased to have been one of the deputation to the Ministry when it was arranged that bulk supplies should be obtained by the Nuneaton Gas Company from Coventry, rather than extend the existing plant.

Personal

Mr. C. B. JONES has been appointed Engineer and General Manager of the Cowes Gas Department in succession to Mr. R. A. Gretton.

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Councillor J. H. I. RADCLIFFE, J.P., has been appointed Chairman, and Councillor DEAN STANLEY, Deputy Chairman, of the Stalybridge Gas-works Committee.

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Alderman F. J. COWIE, Chairman of the Bradford Gas Committee for 15 years prior to the 1945 elections, is Bradford's new Lord Mayor.

* * *

Mr. ROWLAND ARMSTRONG, Shift Engineer in the Darlington Gas Department, has received an appointment with the Christchurch (New Zealand) Gas Company.

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At a meeting of the National Joint Industrial Council for the Gas Industry on Nov. 5, Colonel H. C. SMITH, C.B.E., D.L., J.P., was appointed Chairman in succession to Lord DUKESTON.

* * *

Mr. K. L. PEARCE, Engineer and Manager of Bilston Gas Light and Coke Company, has been selected by Leicester Gas Committee to succeed the late Mr. J. Mitchell as the City's Gas Engineer and Manager.

* * *

To mark his retirement after 44 years' service in the Sleaford (Lincs) Gas Company, Mr. C. H. WARRING, Head Fitter and Meter Inspector, has been presented by the staff with a smoker's table, with pipe, pouch, and tobacco.

* * *

Mr. H. D. GREENWOOD, M.Sc., M.Inst.Gas E., hitherto Controller (Gas), Control Commission for Germany (British Element), has been appointed Director of Public Utilities for the Control Commission. This post involves responsibility for gas, electricity, water and sewage. Mr. Greenwood presented a Paper entitled "Restoration and Control of the Gas Industry in the British Zone of Germany: 1945-47" (I.G.E. Communication No. 312) at the 84th Annual General Meeting of the Institution of Gas Engineers in Birmingham this year.

Diary

Nov. 27.—Southern Association of Gas Engineers and Managers (Eastern District): "Some Aspects of Distribution Work," Lieut.-Colonel J. A. Gould. Gas Industry House, 2.30 p.m.

Dec. 3.—Institution of Heating and Ventilating Engineers: "Moisture Retention," Dr. A. M. J. Janser, Institution of Civil Engineers, 6 p.m.

Dec. 3.—Institute of Fuel (London Section): Meeting at the Institution of Mechanical Engineers, Storey's Gate, 2.30 p.m. Paper, "Thermal Efficiency of Gas Producers with a Discussion of Relative Merits of Producer Gas and Stoker Firing for Chemical and Other Plant," Dr. A. C. Dunningham.

Dec. 4.—London and Southern Junior Gas Association: Visit to Gothic Works of Glover and Main, Ltd., Edmonton, 10.30 a.m.

Dec. 4.—Solid Smokeless Fuels Federation: Executive Committee, 11.30 a.m.; Luncheon, 1 p.m.; Dorchester Hotel, Park Lane, W.1.

Dec. 6.—Wales and Monmouthshire Junior Gas Association: Paper by J. V. Drake and E. S. Brooks, "Coke Oven Practice."

Dec. 6.—Scottish Junior Gas Association: Joint Meeting of Eastern and Western Districts at Edinburgh. Paper by Mr. Joseph White, of Newcastle-upon-Tyne and Gateshead Gas Company.

Dec. 9.—National Federation of Gas Coke Associations: General Committee, Gas Industry House, 10 a.m.

Dec. 9.—British Gas Council: Central Board, Gas Industry House, 2.30 p.m.

Dec. 10.—B.G.C. Gas Salesmen's Circle (Eastern District). Address, "Survey for Salesmen," R. J. Gregg, Ascot Gas Water Heaters, Ltd., Colchester, 2.30 p.m.

Dec. 10.—B.G.C. Domestic Development Committee; Gas Industry House, 2.30 p.m.

Dec. 22.—London and Counties Coke Association: Finance Committee, 11 a.m.; Executive Committee, 11.30 a.m.; Central Committee, 1.30 p.m.

MANCHESTER DISTRICT ASSOCIATION OF GAS ENGINEERS

AN Ordinary General Meeting of the Manchester District Association of Gas Engineers was held at the Midland Hotel, Manchester, on Oct. 31, Mr. Thomas R. Cook (Blackpool) being in the chair. The meeting was preceded by a luncheon.

The Association

Mr. **H. J. Escreet** (President of the Southern Association of Gas Engineers and Managers) proposed the toast of "The Manchester District Association of Gas Engineers." Speaking as President of the Southern Association, he thanked the Manchester Association for inviting him to their meeting, for their hospitality, and for paying him the honour of proposing the toast. On looking through the list of Past Presidents he found there were included the famous names of Thomas Newbigging, Robert Hunter, who was, presumably a forbear of the Robert Hunter of the Gas Light and Coke Company, Isaac Carr, and many others. He realized that anyone who had been brought up in the Gas Industry, as he had been, must feel at home in an Association which had included so many of the most famous men in the Industry. There were, of course, many other names he could quote from the list of Past Presidents of the Manchester Association. He would like to refer to the Honorary Members, and, and in the City of Manchester no mistake could be made in mentioning the name of Sir Frederick West. He noticed that the Manchester Association was founded in the year 1870. It was the first English Association, although the Waverley and the North British Associations had been founded in Scotland some 10 years earlier. The Southern Association, which he represented, was formed later, and he wished to convey its most hearty greetings to the members of the Manchester organization. With the probability of nationalization in the near future, it was appropriate to consider what effect it might have upon District Associations. In his Presidential Address to the Southern Association he had stated that it might be necessary to confine Association activities under nationalization strictly to technical matters, because all administrative and commercial questions would be settled, no doubt, on a regional or national level, and open discussions of policy would not be allowed. This, he was afraid, would bear hardly on the Manchester Association with its two most useful Commercial Sections, though he hoped he might be wrong. District Associations, however, could still do useful work in the dissemination and interchange of technical information. It was to be hoped that they might continue to flourish even if the Industry was nationalized in the near future.

The **President**, in responding to the toast, expressed his regret at the absence of Dr. Harold Hartley, President of the Institution of Gas Engineers, who had been unavoidably prevented from attending the meeting. In addition, he had received a message from Mr. C. H. Bamber (Rochdale), who was unable to attend owing to his daughter having been in a serious train smash in the north. They were all very pleased to have with them Mr. Escreet, and they heartily reciprocated the greetings and good wishes of the Southern Association. The Manchester Association also extended a cordial welcome to their other guests, including Mr. S. G. Deavin (Secretary of the Preston Gas Company), and Mr. T. M. Duncan (Distribution Engineer at Preston). There were also present Mr. L. Walker, Managing Director of Messrs. R. & J. Dempster, Manchester, which firm had invited the members to visit their works, though unfortunately the Committee had not been able to include it in their programme for the Session. It was hoped the members would be able to avail themselves of the privilege at some later date. There were also a number of students who had gained certificates at the recent Examinations of the Institution of Gas Engineers. They were to be congratulated on their successes, and it was hoped that they would all have bright and conspicuously useful careers. They were also honoured with the presence of Mr. S. Tagg (Preston), Sir Frederick West, Mr. C. S. Shapley (Leeds), and Colonel W. M. Carr (United Kingdom Gas Corporation), all of whom had occupied the Presidential Chair not only of the Manchester Association but also of the Institution of Gas Engineers, and had all of them done sterling work in the interests of the Gas Industry generally.

Nationalization

It appeared to be certain now that the Gas Industry was to be nationalized, but this would not deter gas engineers from putting forward every effort to render the best possible service to the public just as they had done in the past. It was the fervent wish of all that there would be freedom from breakdowns during the coming winter and no diminishing of the supply of gas to the consumer. No other industry was more co-operative than their own and in which so much voluntary work was undertaken for the benefit of the public they served. They were all aware that the Gas Engineering Advisory Boards had done much good work during and since the war. Gas engineers were ever ready to give assistance to their colleagues in adjoining undertakings, and undertakings which anticipated difficulties in maintaining full supplies of gas during the forthcoming months should fully explore the possibilities of obtaining assistance from adjoining undertakings. There had been much mutual aid rendered during the past winter of which the public knew little or nothing. During the coming winter consideration must be given to the likelihood of a shortage of house coal and other solid fuels, and, in addition, the difficulties of the electrical industry due to the shortage of plant would add to the troubles of the public. It was therefore up to the Gas Industry to be in a position to meet on-coming loads and to avoid, if possible, restrictions in gas supplies. It would appear that adequate coal stocks had been built up by the Gas Industry to meet the next winter load, and they were all appreciative of the efforts put forward by the Committee of the Coal Board to secure sufficient supplies.

The General Meeting

It was explained that Dr. W. T. K. Braunholtz, Secretary of the Institution of Gas Engineers, had written to Mr. Haworth, Hon. Secretary of the Manchester Association, concerning the remuneration paid to part-time teachers in specialist subjects at Technical Colleges. He stated that the rate of remuneration largely depended upon the local education authority, but it was agreed at the meeting of the Gas Education Committee that individual cases might be referred to the Inspectors at the Ministry of Education, who were able, in certain cases, to advise the local education authority. A copy of a letter upon the subject previously written by Mr. Haworth to Dr. Braunholtz had been sent to Dr. B. C. L. Thorne, H.M.I., who had promised to take the matter up with his colleagues at the Ministry in so far as the Lancashire area was concerned. In regard to a suggestion mentioned in Mr. Haworth's letter to Dr. Braunholtz that the District Associations might consider augmenting the present rates of remuneration, Dr. Braunholtz had been informed, with regret, that the Gas Education Committee felt such a suggestion to be outside the province of the Committee, or indeed, of the Institution.

The members stood in silent token of respect to the memory of Mr. J. Winson Scott, Manchester (Member 1935, Honorary Member 1947); Mr. W. H. T. Johns, Warrington (Member 1936); Mr. James Mitchell, Leicester (Member 1919); and Mr. W. B. McLusky, Halifax (Member 1921).

The following were inducted as Members of the Association:

Mr. R. W. Calderwood (Gas Engineer and Manager, Denaby Main), Mr. R. W. Foulds (Gas Engineer and Manager, Brighouse), Mr. J. F. Lloyd (Engineer and Manager, Wrexham Gas Company), Mr. F. H. Nicholls (Station Engineer, Monkbridge Gas-works, York), and Mr. R. C. Ruggles (Engineer and Manager, Radcliffe and Farnworth District Gas Company).

Mr. **S. Tagg, C.B.E. (Preston)**, presented successful students with certificates they had gained in the recent Examinations of the Institution of Gas Engineers.

Four Years' Developments at Preston

The above titled Paper was then presented by Mr. **A. K. Collinge** (Engineer, Preston Gas Company). The Paper was published in full in the "JOURNAL" of Nov. 5.

The **President** said the Paper would be welcomed by the Association, and throughout the Industry. Mr. Collinge had mentioned some difficulty in the electrostatic precipitation of tar and the effect of corrosion or pitting of purifier valves. This could be a serious matter if a works was relying upon one set of purifiers. The removal of the valve seatings in purifier valves would, in many cases, necessitate the shutting down of the works manufacturing plant. Slip of H_2S due to leaking purifier valves was a liability and difficult to overcome in order to meet satisfactorily the statutory requirements.

Discussion

Mr. **F. G. Shaw** (Buxton) said he had visited the Preston Works in February, 1945, when he saw Mr. Collinge bearing the full stress and strain of the war conditions, and he was pleased to find that the Author was doing so well with his 5 million cu.ft. per day plant that he had produced a maximum of 6¼ million cu.ft. There was an excellent Fuel Expenditure Index, as stated in the Paper, and the high sale of coke per ton of coal was particularly gratifying. In his opinion, it might be advisable to de-dust coke by subjecting it to air pressure, or air gusts of some kind, because the dust was most objectionable, being derived from retort carbon. It was most difficult to get rid of it. Had Mr. Collinge been able to do anything further to cope with the difficulty? In regard to the coke figure, first of all there was a very fine load factor on the plant. The beds were working at full capacity and they were just the right units. There was some heating of secondary air in the setting, to which importance could be attached in regard to the heating of the retorts. The waste heat steam was used for generating electricity, which was a most economical way of utilizing it, while throughout the works there was an avoidance of

small and useless plants which accounted for much of the economy in the works practice. Probably all gas-works engineers had experience of the waste which could occur through isolated steam plants. As Mr. Collinge was carbonizing a suitable coal he was able to avail himself of the excellent coal stacking and lifting arrangements. It was possible for him to isolate the coal according to quality, mixing it in proportion by the aid of the telpher plant in operation at the works. On the occasion of his (Mr. Shaw's) visit to the Preston Works Mr. Collinge was selecting coal for certain beds of retorts, and using coke from these beds in his producers, so that he had always a uniform quality of coke going on the producers. A regular working of the setting resulted, and there was a regular heat. There was an excellent system of chemical control in operation at the Preston Works and records had been kept from the beginning. He considered that the saving in steam by the use of waste heat for steam raising and electrical generation, the heating of the secondary air, and the general efficiency of the unit, had produced results upon which Mr. Collinge could be sincerely congratulated. The layout of the works also had some bearing on the matter. He hoped to visit the works again and witness what further progress had been made.

Helping the Fuel Crisis

Colonel W. M. Carr, O.B.E. (United Kingdom Gas Corporation), remarked that the Paper showed what efficient management could achieve following a period of sound finance. Consideration had been paid, both by the Author of the Paper and his predecessors, to the things which mattered most. The Paper was a clear indication of the relationship of capital cost to results. Reference might be made, in the first instance, to the installation of purifiers. Their planning was not undertaken without consideration being paid to operating cost. The dimensions of operational cost had never been lost sight of, and personally he would go further than Mr. Shaw's statement with reference to fuel consumption. Mr. Collinge had drawn attention to the care which had been exercised to eliminate air infiltration. While the good design of the setting was to be appreciated it did not constitute finality, though it was of vital importance. The Author had rightly stressed the ultimate coke result. This was very important at the present time so far as the ultimate cost of gas was concerned.

The excellent record of the relatively small increase in the price of gas was due to the factor of good management, coupled, as they would all agree, with an increased consumption on the part of the consumer and keeping down overall distribution costs in their relation to capital cost of operation. He would like to refer to the incidence of cost to undertakings because of the removal of the oil subsidy as affecting the cost of carburetted water gas. This was something of a blow to the Industry. Although it was not anticipated that the subsidy would go on for ever, it was hoped that it might be continued until there was a chance of adjusting ideas a little further on the basis of balancing pre-war costs. Water gas was of advantage for the purpose of coping with peak loads, and it became also a matter for serious consideration, in many instances, as a means of providing base-load gas. The principal solution of the fuel trouble lay in the carbonization of all bituminous coal suitable for the purpose produced in this country. Priority should be given to the extension of the carbonization of coal and to the distribution of the resultant products.

The export of coal, as Mr. Collinge had stated, and the conservation of coal at home, depended upon establishment of the necessary conditions. In his (Colonel Carr's) opinion the day would have to come when the use of raw coal, either domestically or industrially in small inefficient steam-raising units, would have to cease. There were large quantities of coal suitable for carbonization which were being used most inefficiently. In some places there was plant not being used, while the Industry was anxious to supply the whole of the fuel requirements, which was what they most certainly could do at a reasonable and economic cost.

The Industry could do a very great deal towards the solving of the fuel crisis. There must be a long-term plan throughout the country, involving an enormous increase in the supplies for domestic and industrial requirements. The whole country was crying out for more gas. The majority of people were receiving good supplies at the present time, but plant could be installed to deal with all the areas throughout the country. Coal which could be used at home for carbonization purposes should not be exported.

The Question of Surplus Heat

Mr. N. G. Appleyard (Leeds) considered that the Paper would be of extreme value to those members of the Association who were faced with a problem similar to that which Mr. Collinge had solved. In the paragraph headed "Operating Results" Mr. Collinge described a system of internal quenching of coke in the extractor chambers by spraying intermittently with mechanism operated from the main extractor drive. Tests had shown that the amount of steam produced by the spraying of the coke was equal to 4½% of the weight of coal carbonized, or an average of 1,150 lb. per hour, and that the resultant saving in solid fuel amounted to 750 tons per annum. It was probably correct to state that all the sensible heat in the residual coke was utilized when steaming to produce 480 B.Th.U. gas. At 450 B.Th.U. some heat must be supplied from other sources than the sensible heat of the coke; perhaps from the retort or by jet air infiltration. On this reasoning there was no surplus heat which could be used for steam raising. He suggested that the 4½% of the heat of coal, in terms of steam raised, could only be brought about by extra being used in the extractor chamber, and the 750 tons of coke saved might be a miscalculation. Water quenching in the extractor chamber did not appear to be in the best interests of the open-grate users. In regard to water-cooled condensers, Mr. Collinge had stated that the use of gas-holder water appeared to be satisfactory, but his, the speaker's, opinion was that it might increase the growth of algae in the water.

Purifier Valves

Mr. G. E. Currier, M.B.E. (Bradford), referred to the purifier valves, and asked if consideration was given to the use of valve discs recessed to take a suitable packing, and if a suitable greasy packing had been used. He mentioned the point because of one experience in 1929 and another in 1937. That particular type of valve had been specified and had been completely successful. There had been no trouble in grinding-in the valves, and the life of the packing had been three to four years. Incidentally, the purity of the gas passed through the purifiers was sufficient to satisfy a test 250 times as stringent as that of the Referees. There had been no slipping of coal gas past the valves.

Colonel Carr had raised a point about water gas which might be amplified. It was stated that Preston had two plants still to be installed. Many undertakings throughout the country were in a similar position, partly as the result of the policy of the Ministry of Fuel and Power with respect to the use of water gas and the saving of coal during the war period. Gas undertakings were now faced with the position that the oil subsidy was to cease, and very little warning had been issued in regard to it. There were three member-representatives on the British Gas Council—Colonel Carr, Mr. C. S. Shapley, and himself. All three of them had done their utmost, through the Committee of the B.G.C., and Mr. J. R. W. Alexander, to impress upon the Ministry of Fuel and Power the fact that while it had not been anticipated the oil subsidy would continue indefinitely, they had expected to receive reasonable notice of its cessation. The reasonable notice asked for was six months, but instead of that they only received a fortnight. Therefore there did appear to be a legitimate ground for complaint against the Ministry. He supported, most heartily, all that Colonel Carr had said about coal conservation. There was no doubt that Colonel Carr had done probably as much as anyone to make clear the necessity for it, and also what could be done by the Industry in regard to the carbonization of coal.

High-Speed Exhausters

Mr. R. L. Greaves (St. Helens) agreed with Mr. Collinge's reference to the Parliamentary and Scientific Committee, and also with his remark that the Gas Industry must take its full share of the solution of present-day problems. Apparently it was the fact that about 95% of the findings of the Committee were in connexion with electricity; gas was scarcely mentioned. What was Mr. Collinge's view in regard to high-speed exhausters? Reference had been made to a type of exhauster used, and then another type was put in and the house had to be extended. This would involve a high capital cost. Many undertakings were using inefficient old-type exhausters which did not save capital costs.

Mr. J. D. Ashworth (Blackburn) spoke in reference to condensation and 90° F. temperature. His own practice had been to keep temperature down to 70° F. The matter was not so important in the north, but it was important in the south in regard to exhausters. To have the purifiers on ground level was a good idea when the site was sufficiently large. Mr. Collinge did not appear to favour steam heating. He (the speaker) was afraid he must differ with him upon that point, though Mr. Collinge stated that lagging overcame the difficulty. At the present time timber was very scarce.

The Author's Reply

Mr. Collinge, replying to the discussion, said he would have no hesitation in having a de-tarrer with only one set of purifiers provided they were equipped with valves having renewable seating and discs, or, alternatively, the packing mentioned by Mr. Currier and a catch box which was manually operated. He had given close attention to the question of valves equipped with soft packing, and did, in fact, convert several existing valves in that way during the past year. He took out the valve discs, cut out the groove in a lathe, and inserted the soft packing. In view of the fact that the seating itself had undergone a certain amount of corrosion the results were satisfactory. It would appear to be a matter of length of life, and, at the time he was in some doubt as to how long the soft packing would last. He agreed with Mr. Currier that a long life was desirable.

Mr. Shaw had referred to moisture content of coke, and he stated that it came out of the retort house with 1% and they added 4% on the screening plant. It was desirable to screen the coke dry, but it had been found that it could be too dry. Many years ago a discussion took place at a meeting of the Association in regard to the quenching of coke, and one of the members stated that when coke merchants came to the works they always selected that which was stored in the open and was wet. When coke was dry there was an immediate trouble with dust, and the only solution of the trouble appeared to be either spraying with water or, perhaps preferably, with a colloid such

as was used in America. It must not be overlooked that if all the dust was eliminated at the works there would be more of it present when the coke was delivered to the consumer. If it was discharged into a wagon and tipped into a cellar there was more dust produced owing to the friable nature of the coke. Therefore he was in favour of spraying coke with water.

Mr. Shaw had referred also to the low Fuel Expenditure Index. It should be borne in mind that the original 10 settings were downward heated and not upward heated, the waste gases leaving at a temperature of 1,160° to 1,200° C. Thus there was a considerable amount of surplus waste heat. There was more than was required, and it was only when the settings were changed to upward heating, as they would be when the major reconstruction took place in a few years' time, that there would be a lower waste gas temperature which would result in a still further increase in overall efficiency.

He appreciated the remarks of Colonel Carr, particularly in regard to the selection of ground level purifiers. The decision was made after a good deal of investigation, and he wished to thank several of the members present for permitting him to inspect their own operating costs. It was only by compiling costs at other works with overhead purifiers that he could transfer the information to his own purposes. Ground space was, of course, of major importance, and many engineers were compelled to adopt overhead purifiers on account of lack of ground space.

Mr. Appleyard had referred to the question of the growth of algae in gasholder water. This was a minor problem, but it was one which he hoped to solve because an unsightly brown deposit was formed on a newly-painted gasholder. Quite a lot of microscopical work had been done, but as yet no chemical remedy had been employed. The gasholder in question was the only one on the site and it was thought better not to incur the risk of creating corrosion difficulties. Since installing the circulation system there had been apparently no increase in the growth. At no time had the temperature of the circulating water from the gasholder tank exceeded the temperature in the gasholder, and the circulation was very good.

In replying to Mr. Greaves he stated that the extension to the exhauster house merely comprised partly taking the wall down and utilizing an existing garage adjoining, so that little structural work was involved.

He agreed also with Mr. Ashworth's point that the exhauster temperature was somewhat high; 90° F. was the figure quoted but it had gone up to 120°F. at times before the new water-cooled condenser was installed. The normal exhauster temperature was now 70° F., and by setting the automatic regulator on the Sissions engine it would keep to that temperature whatever the atmospheric conditions. He had been interested in steam-heated purifiers for many years and had seen many methods applied. Since the specific heat of gas was very low, very little heat was necessary to raise its temperature, and conversely it was rapidly cooled. If purifiers were situated on exposed sites and steam coil heaters installed, the gas lost much of its heat in passing across the top of the box. This could only be prevented by lagging the covers. He agreed with Mr. Ashworth's point concerning the admixture of water gas and coal gas. It would be observed that he had indicated that a space was provided in the water gas engine house for a separate water gas exhauster to be installed, but until that occurred the water gas would be mixed with the coal gas at the exhauster inlet.

Replying to Mr. Escreet, Mr. Collinge stated that the increase in load factor had been watched over a period of many years. There were records going back 50 years, and it was remarkable how it had grown. It had undoubtedly a great influence on the price of gas and the necessary capital expenditure. The maximum hour in recent years had grown in approximately the same proportion as the maximum day, but not in the same proportion as the annual figures.

Vote of Thanks

Mr. **J. H. Clegg** (Oswaldtwistle) proposed a vote of thanks to Mr. Collinge for his Paper. He congratulated him upon the phenomenal increase of output of the Preston Gas Company. It was a story which could be repeated in respect to many undertakings throughout the country, though there were some who did not find themselves in such a fortunate position of being able to meet an increased load. The Directors of the Preston Gas Company had shown great foresight in seeking a fresh location for their new works and in laying down a long-term policy for the continuance of their activities which would result in the establishment of a works capable of such a degree of expansion as to be able to deal with 17 to 20 million cu.ft. per day.

Mr. **A. McDonald** (York) seconded the vote. He considered that Mr. Collinge could congratulate himself on the fact that in 1944 he decided to install coal carbonizing plant. Unfortunately for many gas-work water gas must now be used for base-load purposes, and their difficulties were further increased by the removal of the oil subsidy at very short notice.

Mr. **Collinge** responded.

Election of Officers

The Scrutineers announced that the following had been elected Officers of the Association for the year 1947-48:

President; James MacLusky (Halifax).

Vice-Presidents; J. D. Ashworth (Blackburn), and N. G. Appleyard (Leeds).

Hon. Secretary and Treasurer; Thos. Haworth (Wigan).

Committee; J. Grayston (Stretford), R. Halkett, Junior (Sheffield), W. S. Hubbard (Liverpool), and A. McDonald (York).

Auditors; J. H. Richmond (Runcorn), and A. F. Yates (Goole).

The **President** expressed his appreciation of the response which had been made in regard to the W. H. T. Johns Memorial.

REST HOUSE FOR ENGINEERS

A Board of Trustees appointed by the Council of the Institution of Structural Engineers has received a generous gift from Mr. E. J. Buckton of a large house at Orpington, Kent, standing in extensive grounds, which is now open, on a non-profit making basis, as a rest house for members of professional engineering Institutions, their wives and families.

Further particulars may be obtained from the Secretary of the Institution of Structural Engineers, 11, Upper Belgrave Street, London, S.W.1. Applications for accommodation should be sent direct to Captain H. S. Wynnes, Manager, "Kokine" Rest House, Tubbenden Lane, Orpington, Kent.

THE ROYAL MARRIAGE

The Wandsworth and District Gas Co. expressed its sentiments on the occasion of the marriage of Princess Elizabeth and the Duke of Edinburgh on Nov. 20 through the medium of this centrepiece in its showrooms. The tasteful design and apt wording attracted much attention.

RUGELEY'S CENTENARY

One hundred years ago on Nov. 15, 1847, Rugeley Gas Company was formed by a few prominent townspeople with the object of supplying the town with gas lighting. Rugeley was first partially lighted by coal gas about 1827 from private gas-works belonging to a firm of iron-founders owned by Mr. Hatfield. In 1848 the Hatfield's works were purchased by the Company for £500; the present value is more than 100 times that amount. The charge for gas in 1848 was 8s. 4d. per 1,000 cu.ft., the first year's sales totalling £228, whereas in 1946 the average charge approximated to 5s. per 1,000 cu.ft. and sales of gas were more than £16,000.

Many well-known Rugeley families have been connected with the Company, notably the Gardners, who passed Directorship and Chairmanship from father to son, and the Landors, who were the Company's solicitors, as well as serving on the Board. Others included John Manners (original Secretary at a salary of £30 per annum), Arthur Armshaw, and A. Craddock (former Secretaries).

The first street lighting contract was inaugurated in 1848 at a charge of £3 per lamp, a stipulation being that the lamps should not be lit for seven days at and near the full of each moon. In the early days two fitters employed by the Company were also Directors.

A notable milestone in the Company's history was the erection of the continuous vertical retorts in 1930-31, which brought the plant right up to date. The showrooms in Upper Brook Street were opened in 1929.

In 1935, continuing the desire to benefit the town, the Directors arranged for the transfer of a large part of the Company's stock to Gas Consolidation, Ltd., which, together with the Severn Valley Gas Corporation, controlled some 40 other undertakings in the Severn Valley and the Midlands. The latest improvement was the laying of an 8 in. trunk main between Rugeley and Hednesford in order to safeguard the future gas supply at Rugeley.

Since Gas Consolidation, Ltd., took over the control in 1935, the output of the gas at Rugeley has increased from 170,000 therms per annum to 307,000 therms, equal to an 80% rise, and more than double the output in 1930, when the new plant was built.

JUNIOR ASSOCIATIONS' ACTIVITIES

THE Junior Gas Associations have made a very good start with the 1947-48 session. The number and diversity of their meetings and visit are reflected in the first two winter issues of "GAS," the November number of which is published to-day. After an inevitable wartime suspension, publication is being resumed of the Junior *Transactions*, the 1946-47 volume being promised for the near future. The following brief notes summarize the contents of the October and November issues of "GAS."

Lincoln's New Plant

The newly formed Eastern Junior Gas Association opened its session with a meeting at Lincoln, at which J. S. Marshall, Assistant Engineer and Manager of the Lincoln Gas Department, in his Presidential Address, gave an account of the operation of the new carbonizing plant which was inaugurated last year.

A Change of Name

Manchester Juniors have changed their name to "Manchester District Junior Association of Gas Engineers" in an effort to break away from the outside impression that a Junior Association consists of juniors in age. In revising its rules the Association has decided not to open its ranks to contractor members.

Meters

"The Development of the Dry Gas Meter" is described by S. Armitage (W. Parkinson & Co.) in a Paper to the Wales and Monmouthshire Juniors. An appendix on diaphragms reveals that the leather cut to waste is now used for many items, including meter washers and glove fingers. The shavings are utilized as fertilizer and the skins rejected at the initial inspection are used in the manufacture of ladies' shoes, bags, &c.

Trends in Distribution

R. Air, of the Cowdenbeath Gas Company, spoke from 33 years' experience of gas distribution when he gave his Presidential Address to the Scottish Junior Gas Association (Eastern District). He favours free service to all consumers' appliances, but he is not in favour of free fittings and appliances, or even simple hire. Where consumers have to pay for them they take greater care of them and use them more freely.

Hot Water

"Hot Water in the Service of Man," a Paper presented by G. Ewart (Joint Managing Director of Ewart & Son, Ltd.) to the Midland Juniors, traces the evolution of water heating equipment from Roman times and indicates the present great opportunities for gas. Continuous supply of hot water has become a generally accepted requirement for the home; the present problem is not only to supply hot water, but to supply sufficient to make it available at any time with a minimum of expense and labour, and economy of fuel consumption.

Sir Ernest Smith on Fuel

The economic aspects of fuel are surveyed in an Address by Sir Ernest Smith to a joint meeting of the Midland Junior Gas Association with other bodies at Wolverhampton. Nationalization in his view is not a cure-all, only a change of ownership, and its success will depend on correct running and staffing. The possibilities of integration are great but they can be spoilt by the introduction of personnel untrained either from an administrative or technical point of view.

Ten Years at Walsall

Following his induction as President of the Midland Junior Gas Association, S. Brockbank, of the Walsall Gas Department, devoted his Presidential Address to a review of the past 10 years' work at Walsall—a period in which, mainly on account of war industrial work, the output of gas rose by 60% above pre-war level. In view of past increases a comprehensive scheme has now been prepared for the extension and modernization of the works, to which the Ministry of Fuel and Power has agreed in principle.

Central and District Heating

E. A. Couzens, President of the Institution of Heating and Ventilating Engineers, in a Paper to the Midland Juniors on "The Utilization of Gas in Relation to Central and District Heating," considers impartially the merits of various fuels and points out that from the consumer's angle the advantages to be obtained by consuming gas in lieu of raw coal include ease of control, cleanliness, labour saving, and the saving of space for fuel storage.

A Scottish Viewpoint

Nationalization and other questions are discussed by D. M. Rowan, Engineer and Manager of the Kilwinning Gas Company, in his Presidential Address to the Scottish Junior Gas Association (Western District). He has some strong views on the compensation aspects of nationalization. To determine the value of an undertaking, Stock Exchange quotations are altogether unsound, whether based on present day prices or those of two or three years ago. Financial proposals should, in his view, be made by arbitration, not by the buyer but by an independent body.

Optimism Justified

In his Presidential Address to the Wales and Monmouthshire Juniors, D. Idris Rowlands (Rhymney and Aber Group Gas Companies) recalls that it is just 40 years since his undertaking entered into negotiations for a supply of coke oven gas. What was then regarded as a revolutionary policy has been more than justified. While the Industry, through Area Working Committees, in collaboration with the Ministry of Fuel and Power, is designing a gas grid to cover South Wales, the individual undertakings are pressing on with development schemes. Sales at Rhymney and Aber have grown by 122.8% from 215 million cu.ft. in 1938 to 479 million in 1946.

Gas Industry Problems

In a general talk to the annual meeting of the Yorkshire Junior Gas Association, at which over 30 gas undertakings were represented, Mr. Ralph Halkett, General Manager and Chief Engineer of the Sheffield and District Gas Company, speaks of the advantages of well-planned regionalization but stresses the need for preserving local personal contacts. On the question of coke oven gas, his feeling is that as the coke ovens wear out large central plants should be erected, or alternatively the coal should be carbonized at the gas-works. From the point of view of control he prefers the latter, but under State ownership he advocates that any coke ovens supplying town gas should be owned and operated by the Gas Board.

Liverpool Distribution System

Liverpool's gas distribution system is described in the Presidential Address of F. Bell, Distributing Engineer of the Liverpool Gas Company, to the Manchester District Junior Association of Gas Engineers. He confidently recommends the conversion of existing low pressure mains to carry gas at intermediate high pressures of the order of 60 or 90 in. W.G. for application in balancing pressure conditions on the district and giving an overall improvement in gas supply pressures. The incidence of broken mains is even less on the high pressure system than on the low pressure mains, because in general only the larger mains are converted to carry high pressure gas, and breakage on the larger mains, irrespective of whether high or low pressure, is always less than the average.

District Work Planning

One of the most interesting features the members of the Southern Association of Gas Engineers and Managers saw when they visited the Regents Park Road headquarters of the North Middlesex Gas Company for their Summer Meeting was the district work planning scheme. At the opening meeting of the London and Southern Juniors, H. R. Hart, the Company's Sales and Service Manager, read a Paper on the design and operation of the system, the objects of which are to regulate and control the flow of work; to provide a visual daily statement of work outstanding; to facilitate the co-relation of available labour to work outstanding; and to permit the forward planning of the individual fitters' daily work so that the consumer can be notified of the intended visit.

Oil Gasification in Horizontals

In a Paper on "Gas Oil Gasification in Horizontal Retorts" to the Western Association, R. Miller, Technical Assistant of the Bath Gas Company, sets out the results of the adoption at Bath of the Gas Light and Coke Company's system of oil gasification. After the system had been in operation for some time the need for certain modifications became obvious, and the Paper describes the advantages that were achieved over the original system. The Author, however, concludes that in comparison with normal procedure the system is far from economic; even with half-price oil. The scheme, it must be borne in mind, is an expedient to save coal and at the same time increase the potential capacity of a works for gas making.

Visits

Several interesting works visits are recorded, including that of the London and Southern Juniors to the Letchworth works of the Sigma Instrument Company, Ltd., on Nov. 5; the visit of the Manchester Juniors to the Chesterfield works of the Bryan Donkin Co., Ltd., on Nov. 12; the Scottish (Eastern District) Juniors to the Gothic Works of R. and A. Main, Ltd., at Falkirk, on Nov. 12; the Eastern Juniors' first outing to Welwyn Garden City on Nov. 19 to see the works of the Shredded Wheat Co., and Murphy Radio; and the visit of the Midland Juniors to the Dunlop Rubber Co. Ltd., at Fort Dunlop on Nov. 20

THE KENT COALFIELD*

By G. le B. DIAMOND, M.I.Mech.E., M.Inst.Gas E.

Regional Controller, Ministry of Fuel and Power, Engineer and General Manager, Rochester, Chatham, and Gillingham Gas Company

(*Concluded from page 416*).

MR. T. H. PRATER, of the Isle of Thanet Company, had previously tried Chislet coal in Woodall-Duckham 103 in. retorts in 1930, and in Woodall-Duckham retorts in 1940, and in both cases the results were very unsatisfactory. As a result of the Stratford test, however, Mr. Prater decided to try again, and it is understood that at the present time Chislet coal is passing through one Woodall-Duckham retort at Margate with success.

Future in Relation to the Carbonizing Industries

The Kent Coalfield Survey Report contains an estimate made by the Geological Survey of the resources and reserves in the coalfield from which the Survey Committee formed the opinion that there was sufficient coal to last 100 years, taking the economic survey figure of a minimum of 1,000 million tons to be worked at a hypothetical rate of 10 million tons per annum. On the same basis, taking the maximum figure of reserve at 3,000 million tons, the working life of the coalfield would be 300 years.

In addition to the Kent Survey, the Fuel Research Board published in 1946, through the Stationery Office, a "Rapid Survey of the Coal Reserves" of the British Isles (Survey Paper No. 58). The following is an extract of the section dealing with the Kent coalfield. In reading the extract it must be borne in mind that this particular survey concentrated upon the quantity of coal that was likely to be raised in the next 100 years, and the information was obtained in consultation with individual colliery companies and not with the National Coal Board, who will from now onwards be planning the output of the coalfield as a whole.

"The reserves of the Kent coalfield are adequate to justify new sinkings, and the Southern Regional Valuation Board divided the field into 14 colliery takes, 10 of which—including those for working undersea coal—were to be new collieries. These hypothetical collieries, projected for valuation purposes, and each with an output of about 500,000 tons a year, were planned to come into operation at intervals between the years 1957 and 2026.

"The later examination, by the Coal Survey Officers for Kent, of the development plans submitted by the existing colliery companies to the Valuation Board showed that the plans did not always agree with the developments known to be in progress or to be contemplated. In some instances, for example, parts of the takes allotted to projected collieries had since been leased for working by existing collieries. Consequently after discussions with the managements of the existing collieries, and later with officers of the Coal Commission, it was decided to base the rapid survey in this field upon fresh information supplied by the colliery companies concerning their schemes for future developments. The planned outputs given for Kent, therefore, relate only to the four existing collieries; the additional reserves, however, are the estimated total reserves remaining after the year 2042, based upon a recent assessment of the total reserves made by the Geological Survey.

"The total production at present planned by the four collieries will reach four million tons a year by about 1950, and the total output planned for the period 1942-2042 is about 350 million tons. It is possible, however, that during this period additional outputs will be obtained from new collieries, whether or not these follow the broad lines of some of the collieries planned by the Regional Valuation Board.

"The reserves of this field are almost entirely of medium and low volatile coals. The largest reserve of any single type is in coking coal (type 301), but the combined types corresponding to the coking-steam coals of South Wales (types 202, 203, and 204) form the predominant group.

"The carbonizing industries are only concerned with coals of type 301 (coking coal) of 20-30% volatile matter, and 401 coal with a volatile content of from 30-37% (the gas-making coal)."

Percentage of Gas Coals

The tables referred to in the Rapid Survey give a developed reserve of 114.6 million tons of coking coal (type 301), and 11.5 million tons of gas-making coals (type 401). It should be noted that the latter amount to only 3.3% of the developed reserves of all the coal within the coalfield.

From a study of both Surveys it is evident that the amount of coal so far discovered and likely to be available for the carbonizing industries forms but a fraction of the total reserves mentioned, for, as stated, a very large quantity consists of low volatile coal, some of it of a semi-anthracitic type. The true gas-making coals lie in the north-western area of the coalfield, and of the seams now being worked, the Kent Coalfield Survey (Table XVII, "Total Reserves of Types of Coal," p. 25) indicates that there is a possible reserve of 34.9 million tons of coal containing 30-36.9% of volatile matter. Of the seams which have been proved but are not being worked, the table estimates that there is a reserve of 72.7 million tons. Lower down the volatile scale there is a considerable quantity of strongly caking coals with a volatile content of from 20-30% running into perhaps 720 million tons. The latter would be suitable for coke oven purposes, bearing in mind the low sulphur content.

There can be little doubt that the Kent coalfield is bound to have an influence on the carbonizing industries in the South-East Region, especially when we bear in mind the views of the Durham Survey Committee that the reserves of coking coal, particularly of high grade quality, in the Durham coalfield are in danger of becoming depleted within the next 50 years. On the other hand, the information we have available on the reserves of high volatile coal in Kent is founded on the results largely obtained from exploration by boreholes many years ago. Moreover, these boreholes were put down by financial interests anxious to exploit the coalfield and some of the published results are open to criticism. Since the original borings were put down immense strides have been made in exploratory work of this kind by the oil industry, and whereas 30 years ago a borehole which made 300 ft. in a month was considered to be good going, to-day the Anglo-Iranian Oil Company have drilled over 900 ft. in a single day in this country. The modern method of rotary drilling, however, does not lend itself to coring which is so necessary in the coal measures; nevertheless, further exploratory borings, although expensive, could be made much more easily than when the coalfield was first opened up. We may be quite sure that in due course the National Coal Board will continue further exploration of the coalfield which they have already commenced.

Increased Output in 1948

Taking the short-term view, considerable mechanization development work has recently been undertaken at the Chislet Colliery, as already mentioned, and it is expected that there will be a material increase in output of gas-making coal in the year 1948. It is to be hoped that this valuable bituminous high volatile coking coal will be made available to the carbonizing industries and not dissipated on purposes for which low volatile coals would be more suitable. We have already seen that Chislet coal can be used on practically all types of carbonizing plant now installed in East Kent, and the pattern of the future development of gas manufacture and supply in this area is gradually unfolding. We know that Dover is likely to be the site of a central gas manufacturing plant for the coastal strip from Deal to Dungeness, and in a few years' time it is almost inevitable that a new carbonizing unit must be erected in the Isle of Thanet to cover supplies in that area. It is also known that a number of undertakings from Gravesend to Herne Bay are hard pressed to meet the present demand for gas, so that a considerable amount of reconstruction is required in consequence.

Considerable integration of the Industry must take place in the near future. The question at issue is where should new plant be erected and what area should be supplied therefrom. It is not unreasonable to suppose that an installation of coke ovens should be considered for the north-western corner of the coalfield and the gas produced distributed as far as Gravesend in a westerly direction and possibly Thanet in the eastern side, and I have no doubt a good many minds will be thinking on these lines. On the other hand, we must not overlook some very serious obstacles to such a scheme of development at the present time.

While yielding to none in my enthusiasm of the Kent coalfield, I have come to the conclusion that it would be premature to contemplate the construction of a large coke oven installation in East Kent and that some other site for a carbonizing plant must be sought. Unfortunately, suitable centres for a large unit are very difficult to find, but there are still a few riverside frontages on the Thames which could be developed, although some of them would require heavy capital expenditure on account of the disturbance which has taken place in extracting chalk for the cement industry. There are also one or two sites on the Medway on which a new and large unit could be erected in the next five years.

To sum up, therefore, I am inclined to the view that it will be necessary to progress in several stages to the concentration of manufacture in larger units, with a commencement at Dover, Thanet, and Thames-side, rather than a concentration on one unit in the coalfield.

*A Talk to the Southern Association of Gas Engineers and Managers (Eastern District), Oct. 21.

It is unfortunate that the needs of the carbonizing industries are so pressing, for it would have been better to wait. The arrangement suggested, however, does not preclude the use of Kent coal and at the same time permits of the use of Durham coal, whereas the transport of large quantities of Durham coal from the North to mid-Kent would result in prohibitive prices should there be insufficient high volatile coals available. When it becomes economically possible to work the iron ore in East Kent, the coke oven will come, but not yet.

DISCUSSION

The **Chairman** (Mr. H. J. Escreet) said he was impressed by Mr. Diamond's knowledge of the mining side, apart from the Gas Industry; he had been concerned with the Kent coalfield for the last 20 years, and with the control of it for the last eight years. One was also impressed by Mr. Diamond's comment that it was unfortunate that the needs of the carbonizing industries were so pressing, for it would have been better to wait. There were many things we could plan, but unfortunately we had to get on with the job without waiting for so many things which were necessary to meet the planning.

Mr. **F. Henley Price** (Divisional Chief Scientist, National Coal Board) said that on the subject of dermatitis, he would draw the attention of gas engineers to the interesting investigations on prevention of these diseases now in progress at Dean and Chapter Colliery, Co. Durham, where 0.5% sodium hypochlorite solution was continuously circulated in foot-baths of sufficient width to compel men to tread in them when passing to and from the bathing cubicles. In a private communication last autumn, Dr. J. B. Adamson, Regional Mines Medical Officer, Ministry of Fuel and Power, Northern Division, gave figures showing a substantial reduction in incidence of disease since this system was put into operation. He must, however, emphasize that this was purely a preventive measure designed to control the transmission of the spores responsible for the spread of epidermophytosis and had no effect whatever on established disease.

Experience at Canterbury

Mr. **R. V. Scott** (Canterbury) said he had used Kent coal at Canterbury since 1933 in the horizontal retorts, with very great success; particularly there was an entire elimination of stuck pipes. When using 100% North Country coal—Wearside—they had had to employ two pipe-jumpers; later, when using two-thirds of Durham coal —Horden—and one-third Chislet coal, they were able to do away entirely with the pipe-jumpers, who then became boiler men. From that mixture there was produced 14,620 cu.ft. of gas per ton, equal to 68 therms; that was 2,000 cu.ft. per ton more than when using 100% North Country coal. That was in 1933, and the price then was 17s. 4d per ton delivered to the gas-works; in 1939 it was 24s. 4d. Using 100% Chislet coal, in about 1934, they had obtained 12,254 cu.ft. of 483 B.Th.U. gas per ton, equal to 59.19 therms, before stripping. The coke saleable was 10.29 cwt., breeze 1.16 cwt., making a total of 11.45 cwt.; benzole amounted to 1.57 gall., and tar 10.10 gall. The cost of gas into holder was 7.84d. per 1,000 cu.ft., or 1.69d. per therm.

A very old plant of horizontal retorts had been used, and, knowing the experience of the Westgate Gas Undertaking, his Board had decided to install intermittent vertical chamber ovens. The contractors were asked to guarantee the stability of the settings against swelling pressure, for Chislet coal was very highly swelling. They had given a guarantee under certain conditions—that the charge was not to be too dense, the temperatures not to be too high, or, in other words, the carbonizing period had not to be too short. They were also advised that the coke obtained from the producers would contain a very high percentage of dust. The fusion point of the ash from Chislet coal was very high, and if there were too much pull, the fine dust would be pulled into the flues.

Some astounding results had been obtained with Chislet coal in intermittent vertical chamber ovens. In a performance test carried out by the contractors in 1941 the make per ton was 16,080 cu.ft. of 460 B.Th.U. gas (after stripping), representing 73.9 therms. There were 1.66 gall. of benzole, 12.5 cwt. of coke and breeze saleable, and the thermal efficiency of the plant was 85%. All corrections were made in obtaining those figures.

Typical figures for the half-year ended December, 1946 (prior to using gas oil in the settings), were a make of 15,000 cu.ft. of gas per ton of coal, the calorific value being 462.8 B.Th.U. after stripping, equal to 69.2 therms; benzole amounted to 1.6 gall., and the coke and breeze saleable was 12.25 cwt. The coke was very much more dense than was obtained from the North Country coal, particularly when they came to use intermittent vertical chamber ovens.

Dr. **R. Lessing** said that in every part of a coalfield there were always layers of the high rank and lower rank coals, the higher and lower volatile coals, which were the individual components represented by the names "vitrain," "durain," and so on. Each individual component was pre-destined almost to a particular use. He recommended that the coal be prepared in such a fashion as to extract the individual components. They should endeavour not only to take out from the coal the inert mineral, but to separate the coals into the coking and the non-coking or feebly-coking coals. Further, he urged that the natural dust be removed, preferably by dry methods, which were in existence, and that dust should go directly to the cement industry, which was so active in Kent; that would relieve the remaining coal of a great deal of burden which was always troublesome, whatever was done with the coal; the dust was troublesome in carbonization, it choked firebars in furnaces, and so on. Again, although some of the coal was not the best gas coal, it would contain a certain proportion of gas coal, which ought to be rescued by gravity separation; there could be separated a light portion, a medium heavy portion, and a heavy portion. The industries congregated in the area could take the various fractions of coal, without having to worry about outside industries. There was in the district a certain amount of steam coal, such as was required by power stations, and so on. Without preparation, some of the good gas coal would be sent to power stations, and assets of the country would be wasted.

Margate Results

Mr. **T. H. Prater** (Isle of Thanet Gas Company) said that the Margate tests on Chislet coal in 1930 were made on 103 in. downwardly heated W.D. continuous retorts and again in 1940 on 54 in. retorts of the same design and method of heating. In both cases Chislet run-of-mine crushed to about 4 in. was used and the results were unsatisfactory, due to sticking of the charge in the upper portions of the retort. Recently, they had put to work a bench of 98 in. upwardly heated W.D. continuous retorts, and it was thought that the different method of heating resulting in top temperatures some 300° C. lower than on the retorts used in 1930 or 1940 might remove the cause of the previous sticking of the charge due to the high swelling of the coal.

A test was run on 100 tons last December in two retorts and no change in working was observed compared with that in the other retorts working washed Yorkshire nuts. Coke extraction was easy and no bottom rodding was called for. This experiment was repeated some months later with the same results. During the last few days the whole of their gas produced had been made from Chislet coal and 11 retorts out of the 12 had been working just as smoothly as if using Yorkshire washed nuts.

By this test they had been able to establish that a thermal yield of 68 therms was produced of about 470 B.Th.U. and that the reduction in throughput of these continuous vertical retorts when handling Chislet unscreened coal was about 3 tons per day—*i.e.*, the normal throughput of 9½ tons per diem with Yorkshire was reduced to 6½ tons. The two factors of reduced thermal yield and throughput meant that for the same output it was necessary to increase plant capacity by 50%; not an easy thing in these days. At the conclusion of the test an attempt was made to determine the highest C.V. it was possible to produce in their retorts with this Chislet coal, and it was discovered that a variation in steaming from 20% down to nil only varied the calorific value from 470 to 485, level gauge being maintained at retort tops at all times.

The coke consumption of the producers was found to be increased by about 5% due to the higher heat requirements of Chislet coal for complete carbonization.

A considerable quantity of the coke from Chislet coal was hand-screened and distributed to several of their merchants for personal use and also to several members of their staff. The conclusions were that for domestic coke boilers the coke was quite as good as, if not preferable to, Yorkshire, but for open fires it was not so free-burning as the Yorkshire. The point which received very favourable comment was that the domestic boiler fires could be easily kept in all night. This was, of course, due to the bulk density, which in the case of the unscreened coke was between 27 and 29 lb. per cu.ft.

The bulk density for the coal was determined by levelling their six-ton trailers when they arrived at the works after the ¾ mile journey from the station, and this gave figures which varied from 53 to 59 lb. per cu.ft.

One interesting feature was the very low sulphur figure in the gas produced, this being only some 300 grains per 100 cu.ft. in the crude gas and as low as 8 grains in the purified gas.

A number of tests had been done on the Chislet coal they had used, and the results had varied between the following figures:

	%
Moisture	1.2- 1.9
V.M. on dry basis	27.1-28.8
Ash (dry basis)	6.2-11.3

The swelling number had been 7½ or 8 throughout.

It was thought that perhaps a freshly mined coal might not work so well, and tests were therefore made on some 35 tons which was passing into the retorts within 24 hours of being mined, but not the slightest difference was observed. Weathering of this same coal for some six weeks made no difference to the swelling number and indicated only a very slight decrease in the expansion rate.

Their conclusion was that Chislet coal in its present form—*i.e.*, unscreened—could be carbonized on W.D. continuous vertical retorts upwardly heated without any difficulty.

A Coalfield of Growing Importance

Mr. **L. Muir Wilson** (South Metropolitan Gas Company) said there was no doubt that the Kent coalfield was one of growing importance. He would confine his remarks to a few questions.

1. Were the Kentish iron ore deposits siliceous like those which ran in at Devon, limy as where they ran out in Cleveland, or so nicely balanced in these two ingredients as at Corby situated half way, which needed no flux addition when being smelted?

2. There seemed to be some disagreement among the speakers over the density of the coal. Mr. Diamond quoted a figure of 70 lb. per cu.ft., while one gas engineer had said that the coal he carbonized ran at about 58 lb., and Mr. Price stated that coal was sold to gas-works below 3 in. in size with everything below ¼ in. removed and sold for other purposes in order to reduce the density of charges in the retorts. In these days, he would prefer to have denser charges because they were short of plant, and the more coal they could put into their retorts the higher their throughput was likely to be. On the other hand, a coal of such high density as 70 with only 4% of ash in it might swell so much as to damage carbonizing plant, and he would be glad if Mr. Diamond could tell them something about how it behaved in this respect. This was bound up not only with the swelling power of the coal but with the shrinkage of the coke and how the two came on together. It seemed a pity, too, to discard good gas-making coal if below ¼ in. in size when it was normal coke oven procedure to crush down to 80% below ⅛ in., and for the new South Metropolitan Gas Company ovens the coal was to be reduced to below ½ in. in size.

He read, some time ago, that in the North the coalfield folded back over itself for some distance, so that the bottom seam lay on the top and all seams were bored through twice with the result that there was no coal under the Thames Estuary, but it might recur in Essex. Had coal been proved in Essex?

3. Finally, he asked Mr. Price if the dermatitis to which he referred was what was known in America as "athlete's foot"? If so, he would be interested to hear that sodium hypochlorite foot-baths were a useful prophylactic measure but he hardly imagined that they would constitute a cure.

Mr. **R. H. Ruthven** (Ramsgate) pointed out that as long ago as 1926 his Company had for three months carbonized nothing but Chislet slack in chamber ovens. At the present time they carbonized 100% Chislet coal, and had done so for years. With regard to the sulphur content of the gas, they had had many tests and had sent out gas containing 3½ grains of sulphur; 5-6 grains was their normal. Spontaneous combustion was a very real question, though they had experienced quite extensive fires, and they felt it was necessary to watch Chislet coal closely. It was not necessary for it to be stored in very deep beds to catch fire. At the moment the only coal in Kent which was of any interest for gas making was that from Chislet Colliery. It would seem that the coal in Kent should be processed or handled in such a way that it became available to the customer in whatever form he wished—as gas, electricity, solid coal, or coke—and it should be processed somewhere adjacent to the point of usage.

The Author's Reply

Mr. **Diamond,** replying to the discussion, said he was sure that good preparation would upgrade Chislet coal. He had been concerned with the dermatitis problem in East Kent, and Sir Archibald Gray, who was probably the leading dermatologist in the country, came there; he was of opinion at that time that it would be a long time before anything would be found which could be put in a foot-bath to kill the fungus, although experiments had been made in America. It was most interesting to learn from Mr. Price, therefore, about the use of sodium hypochlorite.

It was particularly interesting to hear Mr. Prater's remarks about there being no steaming reaction when carbonizing Chislet coal, and his opinion that the coke produced was better than that from Yorkshire coal; one or two of the research experts of the Gas Light and Coke Company had expressed that opinion verbally. No-one had said anything about what happened when that coke was put into water gas plants; perhaps they had better draw a veil around that! Replying to Mr. Muir Wilson, he said it had been stated that Kent iron ore would appear to be suitable for the manufacture of low-silicon iron and steel in especially designed plants. In regard to boring in Essex, earlier results had not encouraged it. The Anglo-Iranian Oil Company, however, had in mind some drilling in Essex. Apologizing to Mr. Ruthven for not having mentioned the carbonizing of Kent coal in 1926, he said he well remembered Mr. Ruthven being troubled with the swelling of the Chislet coal in the chamber ovens in that year.

Mr. **W. K. Tate** (Portsmouth), proposing the thanks of the meeting to Mr. Diamond for his Paper, emphasized that it was particularly important. To those interested he would commend the whole series of Survey reports. He also extended thanks to Mr. Price for his most interesting contribution to the discussion. It was especially valuable to know about the measures taken to prevent the spread of dermatitis, and also to learn that there was a coal washing plant under construction which was really going to work. Reference to ash contents of 4 and 5% made them envious, and for the good of the Kent gas companies at any rate it was hoped that the washer would soon be put to work.

The vote of thanks was seconded by Mr. **W. A. Barnett** (Snodland) and carried with acclamation.

EASTERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS

PRESIDENTIAL ADDRESS*

of

RONALD A. WESTON, M.Inst.Gas E.,

Norwich

THE year that has passed since the immediate Past-President's Address at the last Autumn Meeting has not eased the gas engineer's burden which has, if anything, been intensified. The severe weather of the early part of the year strained the already overtaxed gas manufacturing plant to the utmost, but I think it can be fairly stated that the Industry has every reason to be proud of its achievements during that period, and never was the slogan "Thank goodness for gas" more well merited and, I am confident, appreciated by our consumers as evidenced by the many complimentary letters received and by the expressions of thanks tendered to members of my staff on several occasions.

The area covered by this Association's activities contains very few works producing 1,000 million cu.ft. per annum or over, and these undertakings are fairly widely separated throughout the area. Their influence on the smaller undertakings is not so great as in the more populated areas such as in the industrial regions.

As far as I can ascertain approximately 75% of the undertakings in this region produce less than 100 million cu.ft. per annum, and of that 75% no less than 85% manufacture 50 million cu.ft. or less per annum, or 60% if expressed as a percentage of the total number of manufacturing stations. Thus I make no apology for devoting some part of this Address to the position in which these small works find themselves under present-day conditions. It is probably realized that while the number of works of this size is high, the percentage of gas produced is low as compared with the total. You will remember that in the "Evidence submitted to the Ministry of Fuel and Power Committee of Enquiry into the Gas Industry" by the Institution of Gas Engineers it was stated that while 750 undertakings in the United Kingdom had an annual output of less than 100 million cu.ft., these undertakings only represented 6% of the total quantity of gas sold.

While this point is important and must not be lost sight of, I do feel that the importance to the Industry of these small undertakings is not always appreciated in its true proportion, which to my mind is not wholly the percentage of the gas they manufacture, and I submit that the wellbeing and performance of these undertakings has an appreciable effect on public opinion with regard to the Industry as a whole.

The management of the British Gas Light Company's Norwich group of 12 undertakings during the past eight years has provided me with an excellent opportunity to observe how undertakings of varying capacities have been affected in different degrees by the changes which have occurred during the past few years.

The difficulties, caused by the shortage of labour and materials, and steeply rising costs, have probably created greater problems for the smaller undertakings than for the larger, and more particularly do I now refer to the small undertaking not controlled by a group and thus solely dependent upon its own resources. Here let me say at once that I think the greatest credit is due to the managers of many of these small works for the resource and initiative they have displayed in contending with the many difficulties they have had to overcome.

The problems facing these small works to-day have probably never been so acute, and I personally look with the greatest concern at the position now confronting these works, more particular when it is remembered that they are competing with a well organized, efficient, and integrated electricity supply. The question which I think must be put squarely and frankly is, "Can these small undertakings continue to operate as separate gas manufacturing units under these conditions?" The output at many of these works has nearly doubled

* Presented at the Autumn Meeting in London, Nov. 6.

during the past few years, and as an indication of this point I give below a comparison of the gas manufactured at the small undertakings under my control in 1938 and 1946:

	1938 1,000 cu.ft.	1946 1,000 cu.ft.
Attleborough	7,449	13,827
†Aylsham	5,983	10,685
Diss	16,825	30,327
Downham Market... ...	18,515	26,741
‡Gorleston	58,997	76,065
Harleston	5,100	8,854
King's Lynn	114,569	208,940
Loddon	3,800	7,258
Mundesley and Holt ...	18,959	25,229
North Walsham	15,288	21,651
Swaffham	12,823	17,488

You will see that the increase has been of the order of 60%, and in some cases almost doubled. I have included in this list two works manufacturing more than 50 million cu.ft. a year, but I am more concerned about the smaller undertakings, most of which are in rural districts, and I know there are many works of this size which have more than doubled their output. This increased output has been achieved generally with the existing plant and therefore much of the stand-by plant has been kept in almost constant operation. While such an increase in output must be regarded with a certain amount of satisfaction, it brings to these small works problems which are not so easy to solve as on the larger units. In the first place many of these works are situated on cramped sites and have very little room for extensions either in storage capacity, now often inadequate for the higher outputs, or increased manufacturing plant.

In some cases the increase in output has not been an unmixed blessing to these works, especially the very small works where an additional bed cannot be fully operated but has to be kept under fire, which sometimes almost doubles the producer coke consumption with a consequent serious loss in coke revenue. It also, of course, greatly affects the fuel efficiency figures. The lack of storage capacity has, in some cases, compelled additional beds to be worked which would not have been necessary had storage capacity been available for, say, 24 hours.

The Labour Position

The labour position, too, has had a serious effect. The introduction of the 44-hour week, the six-shift week and longer holidays has often resulted in a very large percentage increase in labour, and in many cases the total wages bill is up by over 100% on the 1939 figures; at one small works of which I have knowledge it has been increased by 300%. In addition to all this, coal is now double the price it was in 1939, and the increase in the price of gas, already comparatively high before the war, has not been commensurate with the increase in the cost of labour, coals, materials, &c.

I know that the points here raised are well known and have long been in the minds of gas engineers. I find that in 1934 when my colleague, Mr. Parkinson, presented his Paper, "Modernizing Small Gas Undertakings," this question was raised in the discussion, when it was said that such works were then really up against it, but they have survived and since that date have given excellent service throughout many difficult years. I think it is the Industry's duty to see that the gas supplies to these small towns and villages continue to survive, giving even better service than has been given heretofore.

There is no doubt in my mind that the policy of integration of these small undertakings has not been carried out boldly enough in the past. I am fully aware that no compulsion has been applied in any respect, and very rightly too, but it can be seen that in many cases there are small works which could be linked up economically to a larger neighbouring works, and I know there are instances where the larger neighbour is only too anxious to do this. I feel that the policy of integration should be proceeded with as quickly as possible wherever this is an economic proposition.

While on this point, it will probably be found, when looking into the question of connecting up various works, that it is more economical to use higher pressures and smaller mains than was possible in pre-war days when the cost of main laying was so much cheaper. I should imagine that the cost of transmission is now up some 100% on 1938, and it is quite probable that the cost of mainlaying will increase still further. I also believe that although first costs of linking-up in some cases may not appear on paper to be sound, where an immediate return on the capital is not essential, the better service, supply and quality of gas will bring up the output of the receiving station to such an extent that an adequate return will be available in a very few years. I submit that this matter should be thoroughly explored and that the smaller undertakings should give the question every consideration where it is possible for them to receive a supply.

Remote, Small Works

We now come to the question of the small works which is remote and unlikely to be connected up, at least for some years. There is no doubt in my mind that these works will have to be run at the highest efficiency in order to sell gas at a competitive price. There are several points which I have found in connexion with these small works and which I think are worthy of attention.

† Gas bought in bulk from Norwich.
‡ Gorleston was an evacuation and prohibited area during the war.

Exhausters are generally driven by gas engines, and at some of the smaller works I have found that the gas used for this purpose has amounted to as much as three therms per ton of coal carbonized. In such cases I suggest that the installation of electric drives is well worth consideration. A further point which I think is worthy of study is the installation of small coke screening plants, and the premium so obtained would soon pay for the small capital outlay necessary. At most of the works which I have in mind no additional labour would be required for this purpose.

Another difficulty which has arisen with the increased outputs is that distribution systems are now of insufficient capacity, and it is often found that the initial gasholder pressures are not sufficient to maintain a satisfactory district pressure with a larger output. I have come across several cases where the gasholder pressure has been only 3 in., and this has been overcome in several cases with which I have dealt by the installation of small electric driven boosting fans, which are used during the peak hours of the day and have been found to be a cheap and effective method of dealing with the matter.

In another case where the initial boosting pressure would have to be too high for safe distribution, I have converted the main district feeder to the centre of the town into a boosting main, where it was governed down to feed the rest of the district. Each consumer's service up to the governor was, of course, fitted with a service governor, and although this method was rather expensive in the first place, it resulted in a great improvement in equalizing the district pressures, and both this method and the previously mentioned method have generally resulted in appreciable increases in output.

Gas Unaccounted-For

With regard to gas unaccounted-for, I have found this to be high in many cases, and in the several investigations I have carried out it has rarely been found to be due to physical leakage but is more often than not due to consumers' defective meters, incorrect station metering, and gasholder blowing.

A survey made at a station which is a little worse than the average of several undertakings under my control showed that meters passing unregistered gas from 2 cu.ft. to full capacity totalled 11%. Other meter defects amounted to 4%, and it was estimated that this 15% defective meters accounted for a leakage of some 5%. This leakage has been due, to some extent, to the inability of stations to change their meters during the war, but in some instances I have found that the trouble can be traced back to the high oxygen content of the gas distributed.

In the case of station meters, apart from mechanical troubles, we have found, in many instances, that the faulty registration was due to naphthalene in the drum and oil washing has been resorted to as far as possible, but where on a very small works this was not possible, the meters have been operated on gas oil with very good results.

With regard to gasholder blowing, this generally takes place in the early morning, and where the works are left in charge of one stoker it has been difficult to check. Some benefit was felt in fixing glass tell-tales which broke when the holder rose above a certain point. I mention this by the way as one method of keeping a record, as I am sure you have all suffered from this in the past.

I think these small points are worthy of consideration, and, together with ordinary careful routine, will help to make these small works as efficient units as possible.

Dealing with the question of the control of these works, as you know, in Norfolk we have the Norwich group of 12 undertakings, and the question of connecting some of these works to Norwich is now under active consideration. Those works which are not for the present being considered are controlled by a works foreman or local manager under the supervision of my Norwich staff. One official has been specially appointed for this purpose, and he can call upon the chemist, draughtsman, or distribution staff of the parent station whenever necessary.

There is no doubt in my mind that this form of control which is not otherwise available to the small undertakings, is the next best thing to integration. The advantages arising from such control are obvious, such as technical advice and control being available from the central undertaking, and skilled labour is available such as engine fitters and retort setters. The sales organization visits these works at regular intervals, advertising and cookery demonstrations are arranged and, when the time is ripe, canvassing will be carried out. Through the central stores at the parent works we are able to buy at a better rate in some cases and we are able to keep records and compare the use of oil, sundry goods, &c., works by works. Wherever possible we are also endeavouring to get plant, such as exhausters, gas engines, &c., standardized so that plant is interchangeable from one works to another, which reduces the number of spares required to be held at the central stores.

One of the greatest advantages, in my opinion, is the interchange of labour, and I am perfectly certain that had we not had this facility during the war, some of the works would have failed. This applies particularly to hand-charged stoking, as we are able to transfer these men from one works to another. We are also able to provide holiday relief for the foremen, or managers, at each works.

With regard to the works which does not have the advantage of group control and is entirely isolated, no doubt many of these are

run as efficiently as possible, but they do not have the advantages which they could obtain from group control, and while Gas Engineering Advisory Boards have done and are doing a great deal of work to help these undertakings, I feel that much more could be done. This is not in any way a criticism of the Boards, as it must be remembered that the work carried out by the Boards is entirely voluntary. I do feel, and I believe I am expressing the opinion of some of my colleagues who are in charge of the larger works, that the time is approaching when more assistance will have to be given to this type of undertaking.

How best this can be done is a question which I venture to suggest might be well explored by the Gas Engineering Advisory Boards. I appreciate that it can only be done at the request of these undertakings, but I feel that we should no longer rely upon the voluntary efforts of certain engineers who are members of the Advisory Boards. I should like to see some kind of scheme based on, say, the larger undertakings whereby the smaller undertakings can obtain advice and technical assistance when required. This would operate on similar lines to my own Norwich group. The undertakings thus needing assistance would be required to pay an economical fee to the assisting undertaking. Whether such a scheme would be practical or would even be welcomed by the small undertakings, I do not know, but, as I previously stated, I am sure that some such suggestion should be explored.

There has been a feeling in this Association that if members could get together for informal talks, on both technical and administrative problems, it would be very much appreciated in the area. It will be remembered that this arose from the question of the continuance, or otherwise, of the commercial sections. I feel sure that if such meetings could be arranged they would be of great service to the members, and I have approached the Chairman of the Regional Gas Council to see if it is possible for such an arrangement to be made.

(*To be concluded.*)

GLOUCESTER WOMEN'S GAS COUNCIL

The Gloucester branch of the Women's Gas Council was officially opened last month by the Mayor of Gloucester, Alderman William Jones, J.P., supported by Mrs. B. C. Meehan (Chairman of the Inaugural Committee), Mr. G. M. Gill and Mr. A. T. Voyce, Directors, and Mr. A. L. Morris, Commercial Manager, Gloucester Gas Light Company. Also on the platform were the Mayoress, the City High Sheriff, Councillor B. C. Meehan, Miss D. W. Pidsley, Assistant Secretary of the Women's Gas Council, Mr. W. A. Chard, Distribution Manager, and Miss Madge Russell, Home Service Adviser. On behalf of the Company Mr. Gill apologized for the absence of the Chairman (Sir Leslie Boyce) and extended a welcome to the newly inaugurated branch.

Inauguration of the Gloucester Branch of the Women's Gas Council. Front row (left to right): The Mayoress of Gloucester (Mrs. W. Jones), Mayor of Gloucester (Alderman William Jones J. P.), Mrs. B. C. Meehan (Chairman, Inaugural Committee), Mr. G. M. Gill (Director), Mr. A. L. Morris (Commercial Manager, Gloucester Gas Light Company). Back row (left to right): Miss D. W. Pidsley (Assistant Secretary H.Q. Women's Gas Council), Mr. A. T. Voyce (Director), City High Sheriff (Councillor B. C. Meehan), Mr. W. A. Chard (Distribution Manager, Gloucester Gas Light Company), Miss M. Russell (Home Service Adviser).

In performing the opening ceremony, the Mayor expressed the opinion that there was a definite need for such an organization in the City. He had studied the aims and objects of the Council and he was sure that every one of them would be of interest from the education, domestic and social aspects of their everyday life. The Mayor added that he saw possibilities in the Council for efforts in the direction of saving fuel by voluntary effort rather than by dictation from Government Departments.

During an interval the company was entertained to tea and the proceedings concluded with a film display.

On the three following days demonstrations were given in home laundry, home weaving, cookery, hairdressing, and rug-making; and talks included "The Care of Young Children," "Health Foods" and "Kitchen Planning." For this latter talk the company were favoured by the presence of Miss Jane Drew, F.R.I.B.A. Supporting films, provided by the British Gas Council, the Central Council for Health Education and the Ministry of Information, were shown. Special displays were arranged in the Showrooms in co-operation with gas appliance manufacturers and local firms, linking up the use of gas in everyday life, the theme of the exhibition being "Gas, One thing—and Another."

MALLEABLE IRON CASTINGS

The British Standards Institution has recently published a revision of B.S.309, Whiteheart malleable iron castings, covering two grades of castings, namely grades 1 and 2. The provision and heat treatment of test bars are specified and the test requirements are related to three different sizes of test bars selected according to the important sectional thickness of the castings. A tensile test and either a bend test or an analysis certificate of the phosphorus content are specified and provision is made for additional tests to be called for where appropriate. Details are also included of workmanship and finish, machineability and testing facilities.

The British Standards Institution has also published a revision of B.S.310, Blackheart malleable iron castings, covering three grades ot castings, namely grades 1, 2 and 3. The provision, heat treatmenf and dimensions of test bars are specified. The test requirements include a tensile test and either a bend test or an analysis certificate for the phosphorus content, and provision is also made for additional tests te be called for where appropriate.

Copies of these Standards can be obtained from the offices of the Institution, 24, Victoria Street, London, S.W.1, at a cost of 2s. each.

RE-CIRCULATION OF GASES

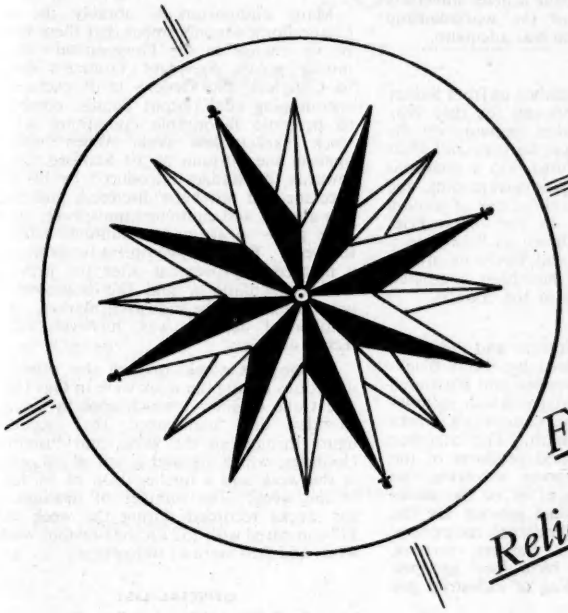
(A "GAS JOURNAL" Abstract)

The subject of "Recirculation of Gases" was dealt with by Mr. E. Watkinson in a Paper to the Yorkshire Section of the Institute of Fuel on Nov. 19. The method is practised in many types of furnaces, ovens, and heat exchangers when working temperatures are required to be 850° C. and under. When burning efficiently even what may be described as lean fuels, the temperature of the products of combustion is in excess of 850° C. To produce products of combustion at this temperature it is necessary either to use excess air in combustion or to admit diluting air to the products of combustion, both methods being grossly inefficient. Dilution to the correct temperature can, however, be effected by recirculation of suitable percentages of products as they leave the heating chamber, brought back by means of a fan to mix with the products of combustion entering the heating chamber.

Examples were given in the Paper of the application of the method. In a direct coal-fired air heater designed to raise 360,000 cu.ft./hour of air to 425° C., the overall efficiency was increased from 58.7% without recirculating to 73.8% with it (or 73% allowing for the coal cost of running a 5 h.p. electric fan), the ratio of recirculation being approximately 2 to 1. In a coke-fire foundry mould and core-drying stove with a recirculation ratio of 6.375 to 1 the saving in fuel was 40.4%. Application to a direct gas-fired oven for baking lacquered work is similar, town gas being used to obviate the presence of dust in combustion products circulated over the lacquered work. In a direct oil-fired workshop air heater, recirculation would effect a saving of 5.43% in oil consumption.

Sketch diagrams were given of all these examples with calculations of heat balances and efficiencies. General conclusions are that where reduction in combustion temperature is necessary it should be achieved by recirculation rather than by the use of excess air, and that the volume of products of combustion should always be a minimum, to reduce chimney losses. To attain these results the combustion chamber must be designed to work with the highest temperature possible, with effective insulation, in which respect much can be done by admitting the recirculated gases to the combustion chamber so that they form an insulating blanket between the hot gases and the walls.

Worcester City Council has authorized the Town Clerk to lodge an objection against the powers being sought by the Worcester New Gas Light Company in its application to the Minister of Fuel and Power regarding a site for the new gas-works.



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